Generation Interconnection
Feasibility Study Report

For

PJM Generation Interconnection Request Queue
Position AA1-063

Huntsville 69 kV

April 2015

Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

General

The Interconnection Customer proposes to install PJM Project #AA1-063, a 3.6 MW (3.6 MW Capacity) landfill gas generating facility (2 Engine Generator Set Units) to the American Electric Power (AEP) transmission system. The primary point of interconnection requested is a new 69kV switch station adjacent to the Huntsville 69kV station, currently tapped from AEP's Modoc-Winchester 69kV line. The location of the generating facility is in Modoc, IN.

The requested in-service date is March 31, 2017.

The requested backfeed date is December 31, 2016

The objective of this Feasibility study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the AEP transmission system. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required to maintain the reliability of the AEP transmission system. Stability analysis is not included as part of this study.

Attachment Facilities

Primary Point of Interconnection (New 69kV Switch Station on Modoc-Winchester 69kV line):

The new 69kV Switch Station on the Modoc-Winchester 69kV line will require at a minimum two (2) circuit breakers (see figure 1). The new switch station will result in a reconfiguration of AEP's delivery point to Huntsville 69kV station on the Modoc-Winchester 69kV line. A new site or an expansion of the existing Huntsville station will be necessary to accommodate this new switch station. Protection schemes will need to be modified at the remote stations and 69 kV metering will need to be installed.

Additionally, note that the AEP breaker facing the generator is not to be used for purposes of generator synchronizing.

The following work is required to connect Project AA1-063:

Station Cost:

- A new two (2) breaker switching station (Figure 1) will need to be constructed to connect the proposed generation to AEP. SCADA, revenue metering, and associated equipment will also need to be installed. Estimated Cost (2015 Dollars): $1,600,000.

NUN	Description	Cost
n4362	Construct Interconnection Substation	$750,000
n4363	Install two new 69 kV Breakers	$550,000
n4364	Install Relays, SCADA, and metering for new substation	$300,000
	Totals	**$1,600,000**

Protection and Relaying Cost:

- Line protections and controls at the existing Modoc 138/69 kV station will need to be upgraded to coordinate with the new switching station. Estimated Cost (2015 Dollars): $200,000

- Line protections and controls at the Winchester 69 kV station will need to be upgraded to coordinate with the new switching station. Estimated Cost (2015 Dollars): $200,000

- Relay settings at the existing Buena Vista 69 kV switch station will need to be reviewed, but costs are not expected to significantly affect the total cost of the preferred connection alternative.

NUN	Description	Cost
n4365	Upgrade Protection and relaying at Modoc Substation	$200,000
n4366	Upgrade Protection and relaying at Winchester Substation	$200,000
	Totals	**$400,000**

Local and Network Impacts

The impact of the proposed generating facility on the AEP System was assessed for adherence with applicable reliability criteria. AEP planning criteria require that the transmission system meet performance parameters prescribed in the AEP FERC Form 715[1] and Connection Requirements for AEP Transmission System[2]. Therefore, these criteria were used to assess the impact of the proposed facility on the AEP System. Huntsville REMC's project AA1-063 was studied as a 3.6 MW (3.6 MW capacity) landfill gas generating facility consistent with the interconnection application. Project #AA1-063 was evaluated for compliance with reliability criteria for summer peak conditions in 2016.

1 http://www.aep.com/about/codeofconduct/OASIS/TransmissionStudies/GuideLines/2014%20AEP%20PJM%20FERC%20715_Final_Part%204.pdf

2 http://www.aep.com/about/codeofconduct/OASIS/TransmissionStudies/Requirements/AEP_Interconnection_Requirements_Rev1.pdf

Network Impacts

The Queue Project AA1-063 was studied as a 3.6 MW (Capacity 3.6 MW) injection at the Huntsville 69 kV substation in the AEP area. Project AA1-063 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AA1-063 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2018

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

Steady-State Voltage Requirements

(Results of the steady-state voltage studies should be inserted here)

None

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed, which will study all overload conditions associated with the overloaded element(s) identified.

Not Applicable

Light Load Analysis - 2018

Not required

System Reinforcements

New System Reinforcements
(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

None

Contribution to Previously Identified System Reinforcements
(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)
(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

None

Short Circuit
(Summary form of Cost allocation for breakers will be inserted here if any)

None

Stability and Reactive Power Requirement
(Results of the dynamic studies should be inserted here)

Not required

Conclusion

Based upon the result of this Feasibility Study, the construction of the Interconnection Customer (PJM Project #AA1-063) landfill gas generation project will require the following interconnection charges.

The cost for the primary point of interconnection (New 69kV Switch Station on Modoc-Winchester 69kV line):

- **Estimated new switching station cost (2015 Dollars): $1,600,000**
- **Estimated protection and relaying cost (2015 Dollars): $400,000**

Total estimated cost for project AA1-063 (2015 Dollars): $2,000,000

The estimates are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements.

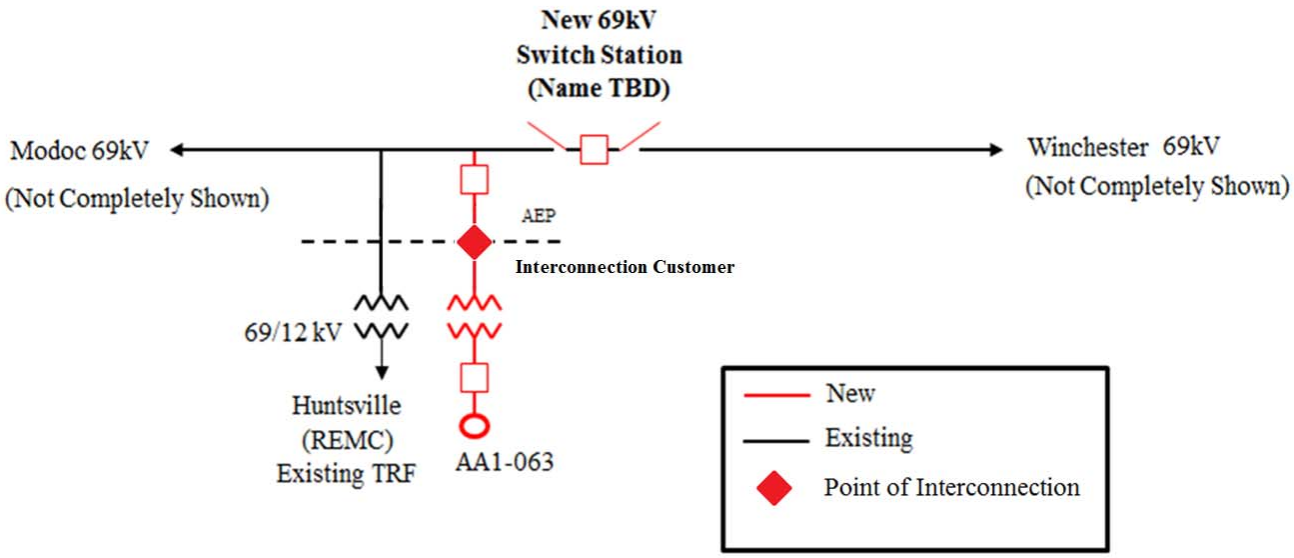

Figure 1 – Single Line Diagram

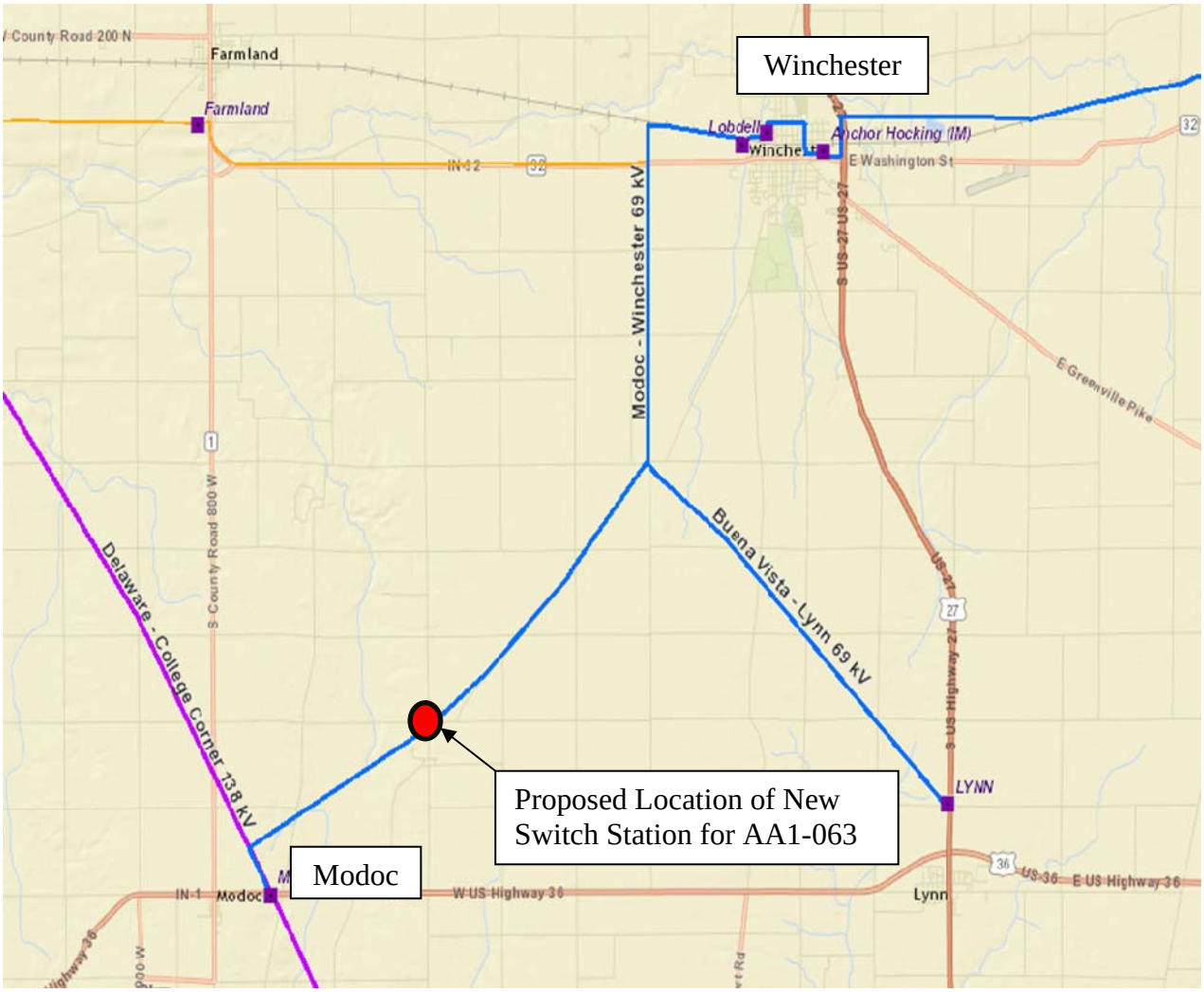

Figure 2: AA1-063 Point of Interconnection